ITEM 5
BSC 01/04
Part 2, Vol 2
Chapter 16, 19, 22, & 23
Various Sections

STRUCTURAL DESIGN / LATERAL FORCES

EXPRESS TERMS

CHAPTER 16 – STRUCTURAL DESIGN REQUIREMENTS

SECTION 1611 - OTHER MINIMUM LOADS

1611.7 Water Accumulation.

_1611.7.1_ All roofs shall be designed with sufficient slope or camber to ensure adequate drainage after the long-term deflection from dead load or shall be designed to resist ponding load, *P,* combined in accordance with Section 1612.2 or 1612.3. Ponding load shall include water accumulation from any source, including snow, due to deflection. See Section 1506 and Table 16-C, Footnote 3, for drainage slope. See Section 1615 for deflection criteria.

1611.7.2 [For BSC] All roofs shall be designed with sufficient slope or camber to ensure adequate drainage after the long-term deflection from dead load or shall be designed to resist ponding load, P, combined in accordance with Section 1612.2 or 1612.3. Ponding load shall include water accumulation from any source, including snow, due to deflection. See Section 1506 and Table 16-C, Footnote 3, for drainage slope. See Section *1613* for deflection criteria.

1612.3.2 Alternate basic load combinations.

_1612.3.2.1_ In lieu of the basic load combinations specified in Section 1612.3.1, structures and portions thereof shall be permitted to be designed for the most critical effects resulting from the following load combinations. When using these alternate basic load combinations a one-third increase shall be permitted in allowable stresses for all combinations, including *W* or *E*.

$$D + L + (L_r \text{ or } S) \qquad\qquad\qquad (12\text{-}12)$$
$$D + L + (W \text{ or } E/1.4) \qquad\qquad\quad (12\text{-}13)$$
$$D + L + W + S/2 \qquad\qquad\qquad (12\text{-}14)$$
$$D + L + S + W/2 \qquad\qquad\qquad (12\text{-}15)$$
$$D + L + S + E/1.4 \qquad\qquad\qquad (12\text{-}16)$$
$$0.9D \pm E/1.4 \qquad\qquad\qquad\quad (12\text{-}16\text{-}1)$$

EXCEPTIONS: 1. Crane hook loads need not be combined with roof live load or with more than three fourths of the snow load or one half of the wind load.

2. Design snow loads of 30 psf (1.44 kN/m2) or less need not be combined with seismic loads. Where design snow loads exceed 30 psf (1.44 kN/m2), the design snow load shall be included with seismic loads, but may be reduced up to 75 percent where consideration of siting, configuration and load duration warrant when approved by the building official.

~~1612.3.2.1~~ 1612.3.2.2 [For BSC] In lieu of the basic load combinations specified in Section 1612.3.1, structures and portions thereof shall be permitted to be designed for the most critical effects resulting from the following load combinations. When using these alternate basic load combinations, a one-third increase shall be permitted in allowable stresses for all combinations including W or E *but not concurrent with the duration of load increase permitted in Division III of Chapter 23.*

$$D + L + (L_r \text{ or } S) \qquad\qquad\qquad (12\text{-}12)$$
$$D + L + (W \text{ or } E/1.4) \qquad\qquad\quad (12\text{-}13)$$
$$D + L + W + S/2 \qquad\qquad\qquad (12\text{-}14)$$
$$D + L + S + W/2 \qquad\qquad\qquad (12\text{-}15)$$
$$D + L + S + E/1.4 \qquad\qquad\qquad (12\text{-}16)$$
$$0.9D \pm E/1.4 \qquad\qquad\qquad\quad (12\text{-}16\text{-}1)$$

EXCEPTIONS: 1.   Crane hook loads need not be combined with roof live load or with more than three fourths of the snow load or one half of the wind load.

2.   Design snow loads of 30 psf (1.44 kN/m^2) or less need not be combined with seismic loads. Where design snow loads exceed 30 psf (1.44 kN/m^2), the design snow load shall be included with seismic loads, but may be reduced up to 75 percent where consideration of siting, configuration and load duration warrant when approved by the building official.

Notation
Authority: Health & Safety Code Section 18934.5
Reference(s): Health & Safety Code, Division 13, Part 2.5, commencing with section 18901.

1629.4.2 Seismic Zone 4 near-source factor.

1629.4.2.1 In Seismic Zone 4, each site shall be assigned a near-source factor in accordance with Table 16-S and the Seismic Source Type set forth in Table 16-U. The value of *Na* used to determine *Ca* need not exceed 1.1 for structures complying with all the following conditions:

1. The soil profile type is *SA, SB, SC* or *SD.*

2. ρ = 1.0.

3. Except in single-story structures, Group R, Division 3 and Group U, Division 1 Occupancies, moment frame systems designated as part of the lateral-force-resisting system shall be special moment-resisting frames.

4. The exceptions to Section 2213.7.5 shall not apply, except for columns in one-story buildings or columns at the top story of multistory buildings.

5. None of the following structural irregularities is present:
Type 1, 4 or 5 of Table 16-L, and Type 1 or 4 of Table 16-M.

1629.2.1 ***1629.4.2.2*** *[For BSC]* In Seismic Zone 4, each site shall be assigned a near-source factor in accordance with Table 16-S and the Seismic Source Type set forth in Table 16-U. The value of N_a used in determining C_a need not exceed 1.1 for structures complying with all the following conditions:

1.   The soil profile type is S_A, S_B, S_C or S_D.

2. ρ = 1.0.

3.   Except in single-story structures, Group R, Division 3 and Group U, Division 1 Occupancies, moment frame systems designated as part of the lateral-force-resisting system shall be special moment-resisting frames.

4.   *** *The provisions in Sections 9.6a and 9.6b of AISC - Seismic Part 1 shall not apply, except for columns in one-story buildings or columns at the top story of multistory buildings.*

5.   None of the following structural irregularities is present: Type 1, 4 or 5 of Table 16-L, and Type 1 or 4 of Table 16-M.

Notation
Authority: Health & Safety Code Section 18934.5
Reference(s): Health & Safety Code, Division 13, Part 2.5, commencing with section 18901.

1630 – MINIMUM DESIGN LATERAL FORCES AND RELATED EFFECTS
1630.1 Earthquake Loads and Modeling Requirements. …
1630.2 Static Force Procedure.

…
1630.2.3 Simplified design base shear.
1630.2.3.1 General …
1630.2.3.2 Base Shear …

<u>**1630.2.3.3 *[For BSC] Distribution***</u>

~~**1630.2.3.3**~~ ***1630.2.3.3.1* Vertical Distribution.** The forces at each level shall be calculated using the following formula:

$$F_x = \frac{3.0\, C_a}{R}\, W_i \qquad\qquad\qquad (30\text{-}12)$$

where the value of C_a shall be determined in Section 1630.2.3.2.

***1630.2.3.3.2 [For BSC] Horizontal Distribution.** Diaphragms constructed of untopped steel decking or wood structural panels or similar light-frame construction are permitted to be considered as flexible.*

Notation
Authority: Health & Safety Code Section 18934.5
Reference(s): Health & Safety Code, Division 13, Part 2.5, commencing with section 18901.

1630.4.2 Vertical combinations.

1630.4.2.1 The value of R used in the design of any story shall be less than or equal to the value of R used in the given direction for the story above.
     EXCEPTION: This requirement need not be applied to a story where the dead weight above that story is less than 10 percent of the total dead weight of the structure.

Structures may be designed using the procedures of this section under the following conditions:

     1. The entire structure is designed using the lowest R of the lateral-force-resisting systems used, or

     2. The following two-stage static analysis procedures may be used for structures conforming to Section 1629.8.3, Item 4.

          2.1 The flexible upper portion shall be designed as a separate structure, supported laterally by the rigid lower portion, using the appropriate values of R and ρ.

          2.2 The rigid lower portion shall be designed as a separate structure using the appropriate values of R and ρ. The reactions from the upper portion shall be those determined from the analysis of the upper portion amplified by the ratio of the *(R/*ρ*)* of the upper portion over *(R/*ρ*)* of the lower portion.

~~*1630.4.2.1*~~ *1630.4.2.2* **[For BSC]** The value of R used in the design of any story shall be less than or equal to the value of R used in the given direction for the story above.

     EXCEPTION: This requirement need not be applied to a story where the dead weight above that story is less than 10 percent of the total dead weight of the structure.

Structures may be designed using the procedures of this section under the following conditions:
1. The entire structure is designed using the lowest R of the lateral-force-resisting systems used, or

     2. The following two-stage static analysis procedures may be used for structures conforming to Section 1629.8.3, Item 4.

          2.1 The flexible upper portion shall be designed as a separate structure, supported laterally by the rigid lower portion, using the appropriate values of R and ρ.

          2.2 The rigid lower portion shall be designed as a separate structure using the appropriate values of R and ρ. The reactions from the upper portion shall be those determined from the analysis of the upper portion multiplied by the ratio of the (R/ρ) of the upper portion over (R/ρ) of the lower portion. *This ratio shall not be taken less than 1.0.*

Notation
Authority: Health & Safety Code Section 18934.5
Reference(s): Health & Safety Code, Division 13, Part 2.5, commencing with section 18901.

1630.8.2.1 General.

1630.8.2.1.1 Where any portion of the lateral-load-resisting system is discontinuous, such as for vertical irregularity Type 4 in Table 16-L or plan irregularity Type 4 in Table 16-M, concrete, masonry, steel and wood elements supporting such discontinuous systems shall have the design strength to resist the combination loads resulting from the special seismic load combinations of Section 1612.4.

EXCEPTIONS: 1. The quantity E_m in Section 1612.4 need not exceed the maximum force that can be transferred to the element by the lateral-force-resisting system.

2. Concrete slabs supporting light-frame wood shear wall systems or light-frame steel and wood structural panel shear wall systems.

For Allowable Stress Design, the design strength may be determined using an allowable stress increase of 1.7 and a resistance factor, Φ, of 1.0. This increase shall not be combined with the one-third stress increase permitted by Section 1612.3, but may be combined with the duration of load increase permitted in Chapter 23, Division III.

~~1630.8.2.1.1~~ 1630.8.2.1.2 [For BSC] Where any portion of the lateral-load-resisting system is discontinuous, such as for vertical irregularity Type 4 in Table 16-L or plan irregularity Type 4 in Table 16-M, concrete, masonry, steel and wood elements *(i.e. columns, beams, trusses or slabs)* supporting such discontinuous systems shall have the design strength to resist the combination loads resulting from the special seismic load combinations of Section 1612.4. *The Connections of such discontinued elements to the supporting members shall be adequate to transmit the forces for which the discontinuous elements were required to be designed.*

EXCEPTIONS: 1. The quantity E_m in Section 1612.4 need not exceed the maximum force that can be transferred to the element by the lateral-force-resisting system.

2. Concrete slabs supporting light-frame wood shear wall systems or light-frame steel and wood structural panel shear wall systems.

For Allowable Stress Design, the design strength may be determined using an allowable stress increase of 1.7 and a resistance factor, Φ, of 1.0. This increase shall not be combined with the one-third stress increase permitted by Section 1612.3, but may be combined with the duration of load increase permitted in Chapter 23, Division III.

1630.8.2.2 Detailing requirements in Seismic Zones 3 and 4.

1630.8.2.2.1 In Seismic Zones 3 and 4, elements supporting discontinuous systems shall meet the following detailing or member limitations:

1. Reinforced concrete elements designed primarily as axial-load members shall comply with Section 1921.4.4.5.

2. Reinforced concrete elements designed primarily as flexural members and supporting other than light-frame wood shear wall systems or light-frame steel and wood structural panel shear wall systems shall comply with Sections 1921.3.2 and 1921.3.3. Strength computations for portions of slabs designed as supporting elements shall include only those portions of the slab that comply with the requirements of these sections.

3. Masonry elements designed primarily as axial-load carrying members shall comply with Sections 2106.1.12.4, Item 1, and 2108.2.6.2.6.

4. Masonry elements designed primarily as flexural members shall comply with Section 2108.2.6.2.5.

5. Steel elements designed primarily as axial-load members shall comply with Sections 2213.5.2 and 2213.5.3.

6. Steel elements designed primarily as flexural members or trusses shall have bracing for both top and bottom beam flanges or chords at the location of the support of the discontinuous system and shall comply with the requirements of Section 2213.7.1.3.

7. Wood elements designed primarily as flexural members shall be provided with lateral bracing or solid blocking at each end of the element and at the connection location(s) of the discontinuous system.

1630.2.2.1 *1630.8.2.2.2 [For BSC]* In Seismic Zones 3 and 4, elements supporting discontinuous systems shall meet the following detailing or member limitations:

1. Reinforced concrete or reinforced masonry elements designed primarily as axial-load members shall comply with Section 1921.4.4.5.

2. Reinforced concrete elements designed primarily as flexural members and supporting other than light-frame wood shear wall systems or light-frame steel and wood structural panel shear wall systems shall comply with Sections 1921.3.2 and 1921.3.3. Strength computations for portions of slabs designed as supporting elements shall include only those portions of the slab that comply with the requirements of these Sections.

3. Masonry elements designed primarily as axial-load carrying members shall comply with Sections 2106.1.12.4, Item 1, and 2108.2.6.2.6.

4. Masonry elements designed primarily as flexural members shall comply with Section 2108.2.6.2.5.

5. * * *

5 6. Steel elements designed primarily as flexural members or trusses shall have bracing for both top and bottom beam flanges or chords at the location of the support of the discontinuous system and shall comply with the requirements of * * * *AISC-Seismic Part I, Section 9.4b.*

6 7. Wood elements designed primarily as flexural members shall be provided with lateral bracing or solid blocking at each end of the element and at the connection location(s) of the discontinuous systems.

Notation
Authority: Health and Safety Code Sections 18934.5
Reference: Health and Safety Code, Division 13, Part 2.5, commencing with section 18901

ITEM 5-1 – Committee Recommendations

<A>   AA   D   FS

APPROVED AS RESUBMITTED

*   *   *
(END OF ITEM)

ITEM 5-2   AS RESUBMITTED

Section 1628 – Symbols and Notations

…

R = numerical coefficient representative of the inherent overstrength and global ductility capacity of lateral-force-resisting systems, as set forth in Table 16-N *[For BSC] Table 16-N.1* or 16-P.
…

Ω = Seismic Force Amplification Factor, which is required to account for structural overstrength and set forth in Table 16-N *[For BSC] Table 16-N.1*.

1629.6 Structural Systems.
1629.6.1 General. Structural systems shall be classified as one of the types listed in Table 16-N *[For BSC] Table 16-N.1* and defined in this section.

1629.6.2 …
1629.6.3 …
1629.6.4 …
1629.6.5 …
1629.6.6 …

1629.6.7 Undefined structural system. A structural system not listed in Table 16-N *[For BSC] Table 16-N.1*
1629.6.8 …

1629.7 Height Limits. Height limits for the various structural systems in Seismic Zones 3 and 4 are given in Table 16-N *[For BSC] Table 16-N.1*.

      EXCEPTION: Regular structures may exceed these limits by not more than 50 percent for unoccupied structures, which are not accessible to the general public.

1629.8 Selection of Lateral Force Procedure
1629.8.1 …
1629.8. 2 …
1629.8.3 Static. The static lateral force procedure of Section 1630 may be used for the following structures:

1. All structures, regular or irregular, in Seismic Zone 1 and in Occupancy Categories 4 and 5 in Seismic Zone 2.

2. Regular structures under 240 feet (73 152 mm) in height with lateral force resistance provided by systems listed in Table 16-N *[For BSC] Table 16-N.1*, except where Section 1629.8.4, Item 4, applies.

3. Irregular structures not more than five stories or 65 feet (19 812 mm) in height.

4. Structures having a flexible upper portion supported on a rigid lower portion where both portions of the structure considered separately can be classified as being regular, the average story stiffness of the lower portion is at least 10 times the average story stiffness of the upper portion and the period of the entire structure is not greater than 1.1 times the period of the upper portion considered as a separate structure fixed at the base.

1629.9   System Limitations.
1629.9.1   Discontinuity. …
1629.9.2   Undefined structural systems. For undefined structural systems not listed in Table 16-N *[For BSC] Table 16-N.1*, the coefficient R shall be substantiated by approve cyclic test data and analysis. ….

~~*1630.2.3.5*~~ **1630.2.3.4 Applicability.** Sections 1630.1.2, 1630.1.3, 1630.2.1, 1630.2.2, 1630.5, 1630.9, 1630.10 and 1631 shall not apply when using the simplified procedure.

EXCEPTION: For buildings with relatively flexible structural systems, the building official may require consideration of $P\Delta$ effects and drift in accordance with Sections 1630.1.3, 1630.9 and 1630.10. Δs shall be prepared using design seismic forces from Section 1630.2.3.2.

Where used, ΔM shall be taken equal to 0.01 times the story height of all stories. In Section 1633.2.9, Formula (33-1) shall read $Fpx = 3.0\ Ca\ R\ wpx$ and need not exceed $1.0\ Ca\ wpx$, but shall not be less than $0.5\ Ca\ wpx$. R and Ωo shall be taken from Table 16-N *[For BSC] Table 16-N.1*.

1630.3 Determination of Seismic Factors.
1630.3.1 Determination of Ωo. For specific elements of the structure, as specifically identified in this code, the minimum design strength shall be the product of the seismic force overstrength factor Ωo and the design seismic forces set forth in Section 1630. For both Allowable Stress Design and StrengthDesign, the Seismic Force Overstrength Factor, Ωo, shall be taken from Table 16-N *[For BSC] Table 16-N.1*.
1630.3.2 Determination of R. The notation R shall be taken from Table 16-N *[For BSC] Table 16-N.1*.

SECTION 1633 – DETAILED SYSTEMS DESIGN REQUIREMENTS
1633.1 General …
1633.2 Structural Framing Systmes.
1633.2.1 General. Four types of general building framing systems defined in Section 1629.6 are recognized in these provisions and shown in Table 16-N *[For BSC] Table 16-N.1*. Each type is subdivided by the types of vertical elements used to resist lateral seismic forces. Special framing requirements are given in this section and in Chapters 19 through 23.

SECTION 1634 – NONBUILDING STRUCTURES

1634.1 General. …

1634.2 Lateral Force. Lateral-force procedures for nonbuilding structures with structural systems similar to buildings (those with structural systems which are listed in Table 16-N *[For BSC] Table 16-N.1*) shall be selected in accordance with the provisions of Section 1629.

> **EXCEPTION:** Intermediate moment-resisting frames (IMRF) may be used in Seismic Zones 3 and 4 for nonbuilding structures in Occupancy Categories 3 and 4 if (1) the structure is less than 50 feet (15 240 mm) in height and (2) the value *R* used in reducing calculated member forces and moments does not exceed 2.8.

Notation
Authority: Health & Safety Code Section 18934.5
Reference(s): Health & Safety Code, Division 13, Part 2.5, commencing with section 18901.

TABLE ~~16-N~~ <u>16.1-N</u> — [For BSC] STRUCTURAL SYSTEMS [1]

BASIC STRUCTURAL SYSTEM[2]	LATERAL-FORCE-RESISTING SYSTEM DESCRIPTION	R	Ωo	HEIGHT LIMIT FOR SEISMIC ZONES 3 AND 4 (feet)
				x 304.8 for mm
1. Bearing wall system	1. Light-framed walls with shear panels			
	a. Wood structural panel walls for structures three stories or less	5.5	2.8	65
	b. All other light-framed walls	4.5	2.8	65
	2. Shear walls			
	a. Concrete	4.5	2.8	160
	b. Masonry	4.5	2.8	160
	3. Light steel-framed bearing walls with tension-only bracing	2.8	2.2	65
	4. Braced frames where bracing carries gravity load			
	a. Steel	4.4	2.2	160
	b. Concrete[3]	2.8	2.2	—
	c. Heavy timber	2.8	2.2	65
2. Building frame system	1. Steel eccentrically braced frame (EBF)	7.0	2.8	240
	2. Light-framed walls with shear panels.			
	a. Wood structural panel walls for structures three stories or less	6.5	2.8	65
	b. All other light-framed walls	5.0	2.8	65
	3. Shear walls			
	a. Concrete	5.5	2.8	240
	b. Masonry	5.5	2.8	160
	4. Ordinary braced frames			
	a. Steel <u>[6]</u>	***<u>5</u>	***<u>2</u>	<u>35</u>[6]
	b. Concrete[3]	5.6	2.2	—
	c. Heavy timber	5.6	2.2	65
	5. Special concentrically braced frames			
	a. Steel	6.4	2.2	240
3. Moment-resisting frame system	1. Special moment-resisting frame (SMRF)			
	a. Steel	8.5	2.8	N.L.
	b. Concrete[4]	8.5	2.8	N.L.
	2. Masonry moment-resisting wall frame (MMRWF)	6.5	2.8	160
	3. Intermediate moment-resisting frame (IMRF)			
	a. Steel <u>[6]</u>	***<u>4.5</u>	***<u>2.8</u>	***<u>35</u>[6]
	b. Concrete[5]	***<u>5.5</u>	***<u>2.8</u>	=
	4. Ordinary moment-resisting frame (OMRF)			
	a. Steel <u>[6]</u>	***<u>3.5</u>	***<u>2.8</u>	<u>-</u>
	b. Concrete[7]	3.5	2.8	
	5. Special truss moment frames of steel (STMF)	6.5	2.8	240

4. Dual systems	1. Shear walls			
	a. Concrete with SMRF	8.5	2.8	N.L.
	b. Concrete with steel OMRF *(Not Permitted)*	4.2	2.8	160
	c. Concrete with concrete IMRF [5]	6.5	2.8	160
	d. Masonry with SMRF	5.5	2.8	160
	e. Masonry with steel OMRF *(Not Permitted)*	4.2	2.8	160
	f. Masonry with concrete IMRF [3]	4.2	2.8	—
	g. Masonry with masonry MMRWF	6.0	2.8	160
	2. Steel EBF			
	a. With steel SMRF	8.5	2.8	N.L.
	b. With steel OMRF *(Not Permitted)*	4.2	2.8	160
	3. Ordinary braced frames *(Not Permitted)*			
	a. Steel with steel SMRF	~~6.5~~ * * *	~~2.8~~ * * *	N.L.
	b. Steel with steel OMRF	~~4.2~~ * * *	~~2.8~~ * * *	160
	c. Concrete with concrete SMRF[3]	~~6.5~~ * * *	~~2.8~~ * * *	—
	d. Concrete with concrete IMRF[3]	~~4.2~~ * * *	~~2.8~~ * * *	—
	4. Special concentrically braced frames			
	a. Steel with steel SMRF	7.5	2.8	N.L.
	b. Steel with steel OMRF *(Not Permitted)*	~~4.2~~ * * *	~~2.8~~ * * *	160
	5. Steel IMRF (Not permitted)	—	—	—
5. Cantilevered column building systems	1. Cantilevered column elements	2.2	2.0	35[7]
6. Shear wall-frame interaction systems	1. Concrete[8]	5.5	2.8	160
7. Undefined systems	See Section 1629.6.7 and 1629.9.2	—	—	—

N.L.– no limit

[1] See Section 1630.4 for combination of structural systems.

[2] Basic structural systems are defined in Section 1629.6.

[3] Prohibited in Seismic Zones 3 and 4.

[4] Includes precast concrete conforming to Section 1921.2.7.

[5] Prohibited in Seismic Zones 3 and 4, except as permitted in Section 1634.2.

[6] * * * *Unless otherwise approved by the enforcement agency, in Seismic Zone 4 :*

[6.1] *Steel IMRF are permitted for buildings 35 ft. or less in height and the dead load of the roof, walls or floors not exceeding 35 psf each; or for single-story buildings 60 ft. or less in height with dead load of the roof or walls not exceeding 15 psf each where the moment joints of field connections are constructed of bolted end plates; or single-family dwellings using light frame construction with R = 3.0 and Ω_o = 2.2.*

[6.2] *Steel OMRF are permitted for buildings 35 ft or less in height with the dead load of the roof, walls or floors not exceeding 15 psf each; or single-story buildings 60 ft or less in height with the dead load of the roof or walls not exceeding 15 psf each and where the moment joints of field connections are constructed of bolted end plates.*

[6.3] *Steel Ordinary Braced Frames are permitted for buildings 35 ft or less in height; or penthouse structures; or single-story buildings 60 ft or less in height with the dead load of the roof or walls not exceeding 15 psf. each.*

[7] Total height of the building including cantilevered columns.

[8] Prohibited in Seismic Zones 2A, 2B, 3 and 4. See Section 1633.2.7.

TABLE 16-O

Amend Table 16-O as follows:

TABLE 16-O—HORIZONTAL FORCE FACTORS, a_P AND R_p

ELEMENTS OF STRUCTURES AND NONSTRUCTURAL COMPONENTS AND EQUIPMENT[1]	a_p	R_p	FOOTNOTE
1. Elements of Structures			
A. Walls including the following:			
(1) Unbraced (cantilevered) parapets.	2.5	3.0	
(2) Exterior walls at or above the ground floor and parapets braced above their centers of gravity.	1.0	3.0	2
(3) All interior-bearing and nonbearing walls.	1.0	3.0	2
B. Penthouse (except when framed by an extension of the structural frame).	2.5	4.0	
C. Connections for prefabricated structural elements other than walls. See also Section 1632.2.	1.0	3.0	3
2. Nonstructural Components	2.5	3.0	
A. Exterior and interior ornamentations and appendages.			
B. Chimneys, stacks and trussed towers supported on or projecting above the roof:	2.5	3.0	
(1) Laterally braced or anchored to the structural frame at a point below their centers of mass.			
(2) Laterally braced or anchored to the structural frame at or above their centers of mass.	1.0	3.0	
C. Signs and billboards.	2.5	3.0	
D. Storage racks (include contents) *with upper storage level more than 5 feet (1524 mm) in height* **[For BSC]**	2.5	4.0	4 *** 4.1
E. Permanent floor-supported cabinets and book stacks more than 6 feet (1829 mm) in height (include contents).	1.0	3.0	5
F. Anchorage and lateral bracing for suspended ceilings and light fixtures.	1.0	3.0	3, 6, 7, 8
G. Access floor systems. **[For BSC]**	1.0	3.0	4, 5, 9 *** 4.1, 5, 9
H. Masonry or concrete fences over 6 feet (1829 mm) high.	1.0	3.0	
I. Partitions.	1.0	3.0	
3. Equipment	1.0	3.0	
A. Tanks and vessels (include contents), including support systems.			
B. Electrical, mechanical and plumbing equipment and associated conduit and ductwork and piping.	1.0	3.0	5, 10, 11, 12, 13, 14, 15, 16
C. Any flexible equipment laterally braced or anchored to the structural frame at a point below their center of mass.	2.5	3.0	5, 10, 14, 15, 16
D. Anchorage of emergency power supply systems and essential communications equipment. Anchorage and support systems for battery racks and fuel tanks necessary for operation of emergency equipment. See also Section 1632.2.	1.0	3.0	17, 18
E. Temporary containers with flammable or hazardous materials.	1.0	3.0	19
4. Other Components			
A. Rigid components with ductile material and attachments.	1.0	3.0	1
B. Rigid components with nonductile material or	1.0	1.5	1

attachments.			
C. Flexible components with ductile material and attachments.	2.5	3.0	1
D. Flexible components with nonductile material or attachments.	2.5	1.5	1

[1]See Section 1627 for definitions of flexible components and rigid components.

[2]See Sections 1633.2.4 and 1633.2.8 for concrete and masonry walls and Section 1632.2 for connections for panel connectors for panels.

[3]Applies to Seismic Zones 2, 3 and 4 only.

[4]Ground supported steel storage racks may be designed using the provisions of Section 1634. Chapter 22, Division VI, may be used for design, provided seismic design forces are equal to or greater than those specified in Section 1632.2 or 1634.2, as appropriate.

[4.1]*[For BSC]* Ground supported steel storage racks may be designed using the provisions of Section 1634. Chapter 22A, Division *X*, may be used for design, provided seismic design forces are equal to or greater than those specified in Section 1632.2 or 1634.2, as appropriate.

[5]Only attachments, anchorage or restraints need be designed.

[6]Ceiling weight shall include all light fixtures and other equipment or partitions that are laterally supported by the ceiling. For purposes of determining the seismic force, a ceiling weight of not less than 4 psf (0.19 kN/m2) shall be used.

[7]Ceilings constructed of lath and plaster or gypsum board screw or nail attached to suspended members that support a ceiling at one level extending from wall to wall need not be analyzed, provided the walls are not over 50 feet (15 240 mm) apart.

[8]Light fixtures and mechanical services installed in metal suspension systems for acoustical tile and lay-in panel ceilings shall be independently supported from the structure above as specified in UBC Standard 25-2, Part III.

[9]Wp for access floor systems shall be the dead load of the access floor system plus 25 percent of the floor live load plus a 10-psf (0.48 kN/m2) partition load allowance.

[10]Equipment includes, but is not limited to, boilers, chillers, heat exchangers, pumps, air-handling units, cooling towers, control panels, motors, switchgear, transformers and life-safety equipment. It shall include major conduit, ducting and piping, which services such machinery and equipment and fire sprinkler systems. See Section 1632.2 for additional requirements for determining *ap* for nonrigid or flexibly mounted equipment.

[11]Seismic restraints may be omitted from piping and supports if all the following conditions are satisfied:

[11.1]Lateral motion of the piping or duct will not cause damaging impact with other systems.
[11.2]The piping or duct is made of ductile material with ductile connections.
[11.3]Lateral motion of the piping or duct does not cause impact with fragile appurtenances (e.g. sprinkler heads) with any other equipment, piping, or structural member.
[11.4]Lateral motion of the piping or duct does not cause loss of system vertical support.
[11.5]Rod-hung supports of less than 12 inches (305 mm) in length have top connections that cannot develop moments.
[11.6]Support members cantilevered up from the floor are checked for stability.
[12]Seismic restraints may be omitted from electrical raceways, such as cable trays, conduit and bus ducts, if all the following conditions are satisfied:

[12.1] Lateral motion of the raceway will not cause damaging impact with other systems.

[12.2] Lateral motion of the raceway does not cause loss of system vertical support.

[12.3] Rod-hung supports of less than 12 inches (305 mm) in length have top connections that cannot develop moments

[12.4] Support members cantilevered up from the floor are checked for stability.

[13]Piping, ducts and electrical raceways, which must be functional following an earthquake, spanning between different buildings or structural systems shall be sufficiently flexible to withstand relative motion of support points assuming out-of-phase motions.

[14]Vibration isolators supporting equipment shall be designed for lateral loads or restrained from displacing laterally by other means. Restraint shall also be provided, which limits vertical displacement, such that lateral restraints do not become disengaged. a_p and R_p for equipment supported on vibration isolators shall be taken as 2.5 and 1.5, respectively, except that if the isolation mounting frame is supported by shallow or expansion anchors, the design forces for the anchors calculated by Formula (32-1), (32-2) or (32-3) shall be additionally multiplied by a factor of 2.0.

[15]Equipment anchorage shall not be designed such that lateral loads are resisted by gravity friction (e.g., friction clips).

[16]Expansion anchors, which are required to resist seismic loads in tension, shall not be used where operational vibrating loads are present.

[17]Movement of components within electrical cabinets, rack- and skid-mounted equipment and portions of skid-mounted electromechanical equipment that may cause damage to other components by displacing, shall be restricted by attachment to anchored equipment or support frames.

[18]Batteries on racks shall be restrained against movement in all directions due to earthquake forces.

[19]Seismic restraints may include straps, chains, bolts, barriers or other mechanisms that prevent sliding, falling and breach of containment of flammable and toxic materials. Friction forces may not be used to resist lateral loads in these restraints unless positive uplift restraint is provided which ensures that the friction forces act continuously.

Note:
Authority: Health and Safety Code Sections 18934.5
Reference: Health and Safety Code, Division 13, Part 2.5, commencing with section 18901
Appendix Chapter 16

DIVISION IV - EARTHQUAKE REGULATIONS FOR SEISMIC-ISOLATED STRUCTURES

SECTION 1665 - REQUIRED TESTS OF ISOLATION SYSTEM

1665.2.3 Sequence and cycles.

1665.2.3.1 The following sequence of tests shall be performed for the prescribed number of cycles at a vertical load equal to the average $D+ 0.5L$ on all isolator units of a common type and size:

1. Twenty fully reversed cycles of loading at a lateral force corresponding to the wind design force.

2. Three fully reversed cycles of loading at each of the following increments of displacement: $0.2 D_D$, $0.5 D_D$ and $1.0 D_D$, $1.0D_M$.

3. Three fully reversed cycles at the total maximum displacement, $1.0D_{TM}$.

4. ($15C_{VD}/C_{VA}B_D$), but not less than 10, fully reversed cycles of loading at 1.0 times the total design displacement, $1.0D_{TD}$.

1665.2.3.2 [For BSC] The following sequence of tests shall be performed for the prescribed number of cycles at a vertical load equal to the average $D+ 0.5L$ on all isolator units of a common type and size:

1. Twenty fully reversed cycles of loading at a lateral force corresponding to the wind design force.

2. Three fully reversed cycles of loading at each of the following increments of displacement: $0.2 D_D$, $0.5 D_D$ and $1.0 D_D$, $1.0D_M$.

3. Three fully reversed cycles at the total maximum displacement, $1.0D_{TM}$.

4. *($15C_{VD}/C_{AD}B_D$)*, but not less than 10, fully reversed cycles of loading at 1.0 times the total design displacement, $1.0D_{TD}$.

1665.4 System Adequacy.

1665.4.1 The performance of the test specimens shall be assessed as adequate if the following conditions are satisfied:

1. The force-deflection plots of all tests specified in Section 1665.2 have a positive incremental force-carrying capacity.

2. For each increment of test displacement specified in Section 1665.2.3, Item 2, and for each vertical load case specified in Section 1665.2.3:

2.1 There is no greater than a plus or minus 10 percent difference between the effective stiffness at each of the three cycles of test and the average value of effective stiffness for each test specimen.

2.2 There is no greater than a 10 percent difference in the average value of effective stiffness of the two test specimens of a common type and size of the isolator unit over the required three cycles of test.

3. For each specimen there is no greater than a plus or minus 20 percent change in the initial effective stiffness of each test specimen over the ($15C_{VD}/C_{VA}B_D$), but not less than 10, cycles of the test specified in Section 1665.2.3, Item 4.

4. For each specimen there is no greater than a 20 percent decrease in the initial effective damping over for the ($15C_{VD}/C_{VA}B_D$), but not less than 10, cycles of the test specified in Section 1665.2.3, Item 4.

5. All specimens of vertical load-carrying elements of the isolation system remain stable at the total maximum displacement for static load as prescribed in Section 1665.2.6.

1665.4.2 [For BSC] The performance of the test specimens shall be assessed as adequate if the following conditions are satisfied:

1. The force-deflection plots of all tests specified in Section 1665.2 have a positive incremental force-carrying capacity.

2. For each increment of test displacement specified in Section 1665.2.3, Item 2, and for each vertical load case specified in Section 1665.2.3:

2.1 There is no greater than a plus or minus 10 percent difference between the effective stiffness at each of the three cycles of test and the average value of effective stiffness for each test specimen.

2.2 There is no greater than a 10 percent difference in the average value of effective stiffness of the two test specimens of a common type and size of the isolator unit over the required three cycles of test.

3. For each specimen there is no greater than a plus or minus 20 percent change in the initial effective stiffness of each test specimen over the *($15C_{VD}/C_{AD}B_D$)*, but not less than 10, cycles of the test specified in Section 1665.2.3, Item 4.

4. For each specimen there is no greater than a 20 percent decrease in the initial effective damping over for the *($15C_{VD}/C_{AD}B_D$)*, but not less than 10, cycles of the test specified in Section 1665.2.3, Item 4.

5. All specimens of vertical load-carrying elements of the isolation system remain stable at the total maximum displacement for static load as prescribed in Section 1665.2.6.

…(Section unchanged except as noted above)

ITEM 5-2 – Committee Recommendations

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APPROVED AS RESUBMITTED

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ITEM 5-3　　　　AS RESUBMITTED

CHAPTER 18 – FOUNDATIONS AND RETAINING WALLS

SECTION 1809 - FOUNDATION CONSTRUCTION - SEISMIC ZONES 3 AND 4

1809.5 Special Requirements for Piles and Caissons.

1809.5.1 General.

1809.5.1.1 Piles, caissons and caps shall be designed according to the provisions of Section 1603, including the effects of lateral displacements. Special detailing requirements as described in Section 1809.5.2 shall apply for a length of piles equal to 120 percent of the flexural length. Flexural length shall be considered as a length of pile from the first point of zero lateral deflection to the underside of the pile cap or grade beam.

1809.5.1.2 [For BSC] Piles, caissons and caps shall be designed according to the provisions of Section *1605*, including the effects of lateral displacements. Special detailing requirements as described in Section 1809.5.2 shall

apply for a length of piles equal to 120 percent of the flexural length. Flexural length shall be considered as a length of pile from the first point of zero lateral deflection to the underside of the pile cap or grade beam.

CHAPTER 19 – CONCRETE

DIVISION II

1903.11 Glass Fiber Reinforced Concrete.

1903.11.1 Recommended Practice for Glass Fiber Reinforced Concrete Panels, Manual 128.

1903.11.2 [For BSC} Recommended Practice for Glass Fiber Reinforced Concrete Panels, *PCI* Manual 128.

1915.2.2 Base area of footing or number and arrangement of piles.

1915.2.2.1 Base area of footing or number and arrangement of piles shall be determined from the external forces and moments (transmitted by footing to soil or piles) and permissible soil pressure or permissible pile capacity selected through principles of soil mechanics. *External forces and moments are those resulting from un-factored loads (D, L, W and E) specified in Chapter 16.*

~~*1915.2.2.1*~~ *1915.2.2.2 [For BSC]* Base area of footing or number and arrangement of piles shall be determined from the external forces and moments (transmitted by footing to soil or piles) and permissible soil pressure or permissible pile capacity selected through principles of soil mechanics. External forces and moments are those resulting from ⁎⁎⁎ the load combinations of Section 1612.3.

SECTION 1921 – REINFORCED CONCRETE STRUCTURES RESISTING FORCES INDUCED BY EARTHQUAKE MOTION
1921.0 Notations. …
1921.1 Definitions. …
1921.2 General.
1921.2.1 Scope.
…
1921.2.1.7 In structures having precast gravity systems, the lateral-force-resisting system shall be one of the systems listed in Table 16-N [For BSC] Table 16-N.1 and shall be well distributed using one of the following methods:

1. The lateral-force-resisting systems shall be spaced such that the span of the diaphragm or diaphragm segment between lateral-force-resisting systems shall be no more than three times the width of the diaphragm or diaphragm segment.

Where the lateral-force-resisting system consists of moment-resisting frames, at least [(Nb/4) + 1] of the bays (rounded up to the nearest integer) along any frame line at any story shall be part of the lateral-force-resisting system, where Nb is the total number of bays along that line at that story. This requirement applies to only the lower two thirds of the stories of buildings three stories or taller.

2. All beam-to-column connections that are not part of the lateral-force-resisting system shall be designed in accordance with the following:

Connection design force. *The connection shall be designed to develop strength M. M is the moment developed at the connection when the frame is displaced by Δs assuming fixity at the connection and a beam flexural stiffness of no less than one-half of the gross section stiffness. M shall be sustained through a deformation of Δm [for OSHPD 2] ΔM.*

Connection characteristics. *The connection shall be permitted to resist moment in one direction only, positive or negative. The connection at the opposite end of the member shall resist moment with same positive or negative sign. The connection shall be permitted to have zero flexural stiffness up to a frame displacement of Δs.*

In addition, complete calculations for the deformation compatibility of the gravity load carrying system shall be made in accordance with Section 1633.2.4 using cracked section stiffnesses in the lateral-force-resisting system and the diaphragm.

Where gravity columns are not provided with lateral support on all sides, a positive connection shall be provided along each unsupported direction parallel to a principal plan axis of the structure. The connection shall be designed

for a horizontal force equal to 4 percent of the axial load strength (P0) of the column. The bearing length shall be 2 inches (51 mm) more than that required for bearing strength

Notation
Authority: Health & Safety Code Section 18934.5
Reference(s): Health & Safety Code, Division 13, Part 2.5, commencing with section 18901.

1928.1.2.3 Basic combinations.

1928.1.2.3.1   When permitted by Section 1928.1, structures, components and foundations shall be designed so that their design strength exceeds the effects of the factored loads in the following combinations:

1.   1.4D
2.   1.2D + 1.6L + 0.5(L_r or S or R)
3.   1.2D + 1.6(L_r or S or R) + (0.5L or 0.8W)
4.   1.2D + 1.3W + 0.5L + 0.5(L_r or S or R)
5.   1.2D ± 1.5E + (0.5L or 0.2S)
6.   0.9D ± (1.3W or 1.5E)

   EXCEPTIONS: 1. The load factor on L in combinations 3, 4 and 5 shall equal 1.0 for garages, areas occupied and places of public assembly, and all areas where the live load is greater than 100 lb./ft.[2] (pounds-force per square foot) (4.79 kPa).

   2. Each relevant strength limit state shall be considered. The most unfavorable effect may occur when one or more of the contributing loads are not acting.

~~***1928.1.2.3.2***~~ ***1928.1.2.3.2 [For BSC]*** When permitted by Section 1928.1, structures, components and foundations shall be designed so that their design strength exceeds the effects of the factored loads in the following combinations:

1.   1.4D
2.   1.2D + 1.6L + 0.5(L_r or S or R)
3.   1.2D + 1.6(L_r or S or R) + (0.5L or 0.8W)
4.   1.2D + 1.3W + 0.5L + 0.5(L_r or S or R)
5.   1.2D ± <u>* * *</u> *1.0E* + (0.5L or 0.2S)
6.   0.9D ± (1.3W or <u>* * *</u> *1.0E)*

   EXCEPTIONS: 1. The load factor on L in combinations 3, 4 and 5 shall equal 1.0 for garages, areas occupied and places of public assembly, and all areas where the live load is greater than 100 lb./ft.[2] (pounds-force per square foot) (4.79 kPa).

   2. Each relevant strength limit state shall be considered. The most unfavorable effect may occur when one or more of the contributing loads are not acting.

Notation
Authority: Health & Safety Code Section 18934.5
Reference(s): Health & Safety Code, Division 13, Part 2.5, commencing with section 18901.

ITEM 5-3 – Committee Recommendations

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ITEM 5-4   AS RESUBMITTED

CHAPTER 21 – MASONRY

2108.2.6.2.6 Members subjected to axial force and flexure.

2108.2.6.2.6.1 The requirements set forth in this subsection apply to piers proportioned to resist flexure in conjunction with axial loads.

1. **Longitudinal reinforcement.** A minimum of four longitudinal bars shall be provided at all sections of every pier.

Flexural reinforcement shall be distributed across the member depth. Variation in reinforcement area between reinforced cells shall not exceed 50 percent.

Minimum reinforcement ratio calculated over the gross cross section shall be 0.002.

Maximum reinforcement ratio calculated over the gross cross section shall be 0.15$f.m/fy$.

Maximum bar diameter shall be one eighth nominal width of the pier.

2. **Transverse reinforcement.** Transverse reinforcement shall be hooked around the extreme longitudinal bars with standard 180-degree hook as defined in Section 2108A.2.2.4.

Within an end region extending one pier depth from the end of the beam, and at any region at which flexural yielding may occur during seismic or wind loading, the maximum spacing of transverse reinforcement shall not exceed one fourth the nominal depth of the pier.

The maximum spacing of transverse reinforcement shall not exceed one half the nominal depth of the pier. The minimum transverse reinforcement ratio shall be 0.0015.

3. **Lateral reinforcement.** Lateral reinforcement shall be provided to confine the grouted core when compressive strains due to axial and bending forces exceed 0.0015, corresponding to factored forces with R_W equal to 1.5. The unconfined portion of the cross section with strain exceeding 0.0015 shall be neglected in computing the nominal strength of the section.

2108.2.6.2.6.2 [For BSC] The requirements set forth in this subsection apply to piers proportioned to resist flexure in conjunction with axial loads.

1. **Longitudinal reinforcement.** A minimum of four longitudinal bars shall be provided at all sections of every pier.

Flexural reinforcement shall be distributed across the member depth. Variation in reinforcement area between reinforced cells shall not exceed 50 percent.

Minimum reinforcement ratio calculated over the gross cross section shall be 0.002.

Maximum reinforcement ratio calculated over the gross cross section shall be 0.15$f.m/fy$.

Maximum bar diameter shall be one eighth nominal width of the pier.

2. **Transverse reinforcement.** Transverse reinforcement shall be hooked around the extreme longitudinal bars with standard 180-degree hook as defined in Section 2108A.2.2.4.

Within an end region extending one pier depth from the end of the beam, and at any region at which flexural yielding may occur during seismic or wind loading, the maximum spacing of transverse reinforcement shall not exceed one fourth the nominal depth of the pier.

The maximum spacing of transverse reinforcement shall not exceed one half the nominal depth of the pier. The minimum transverse reinforcement ratio shall be 0.0015.

3. **Lateral reinforcement.** Lateral reinforcement shall be provided to confine the grouted core when compressive strains due to axial and bending forces exceed 0.0015, corresponding to factored forces with *R* equal to *1.0*. The unconfined portion of the cross section with strain exceeding 0.0015 shall be neglected in computing the nominal strength of the section.

…(Section unchanged except as noted above)

CHAPTER 22 – STEEL

2204.1 Load and Resistance Factor Design.

2204.1.1 Steel design based on load and resistance factor design method shall resist the factored load combinations of section 1612.2 in accordance with the applicable requirements of section 2205. Seismic design of structures, where required, shall comply with Division IV for structures designed in accordance with Division II (LRFD).

~~***2204.1.1***~~ ***2204.1.2*** **[For BSC]** Steel design based on load and resistance factor design method shall resist the factored load combinations of section 1612.2 in accordance with the applicable requirements of section 2205. * * *

2204.2 Allowable Stress Design.

2204.2.1 Steel design based on allowable stress design methods shall resist the factored load combinations of section 1612.3 in accordance with the applicable requirements of section 2205. Seismic design of structures, where required, shall comply with Division V for structures designed in accordance with Division III (ASD).

~~***2204.2.1***~~ ***2204.2.2*** *[For BSC] Steel design based on allowable stress design methods shall resist the factored load combinations of section 1612.3 in accordance with the applicable requirements of section 2205.* * * *

Notation
Authority: Health & Safety Code Section 18934.5
Reference(s): Health & Safety Code, Division 13, Part 2.5, commencing with section 18901.

Division IV – SEISMIC PROVISIONS FOR STRUCTURAL STEEL BUILDINGS

NOTE: This division shall not apply to applications regulated by the Building Standards Commission as referenced in Section 101.17.3. See Chapter 22B, Division IV.

Division V – SEISMIC PROVISIONS FOR STRUCTURAL STEEL BUILDINGS FOR USE WITH ALLOWABLE STRESS DESIGN

NOTE: This division shall not apply to applications regulated by the Building Standards Commission as referenced in Section 101.17.3 See Chapter 22, Division V

Notation
Authority: Health & Safety Code Section 18934.5
Reference(s): Health & Safety Code, Division 13, Part 2.5, commencing with section 18901.

ITEM 5-4 – Committee Recommendations

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ITEM 5-5   **AS RESUBMITTED**

CHAPTER 23 – WOOD

Division III – DESIGN SPECIFICATIONS FOR ALLOWABLE STRESS DESIGN OF WOOD BUILDINGS

Part I – ALLOWABLE STRESS DESIGN OF WOOD

This standard, with certain exceptions, is the ANSI/NFoPA NDS-91 [For BSC] *NDS-97* National Design Specification for Wood Construction of the American Forest and Paper Association, Revised 1991 [For BSC] *1997* Edition, and the Supplement to the 1991 [For BSC] *1997* Edition, National Design Specification, adopted by reference.

The National Design Specification for Wood Construction, Revised 1991 [For BSC] *1997* Edition, and supplement are available from the American Forest and Paper Association, 1111 19th Street, NW, Eighth Floor, Washington, DC, 20036.

[For BSC] For applications regulated by the Building Standards Commission as referenced in section 101.17.3 this standard, with certain exceptions, is the ANSI/AF&PA NDS-01 National Design Specification for Wood Construction of the American Forest and Paper Association, 2001 Edition, and the Supplement to the 2001 Edition, National Design Specification, adopted by reference.

SECTION 2316 DESIGN SPECIFICATIONS

2316.1 Adoption and Scope.

2316.1.1 The National Design Specification for Wood Construction, Revised 1991 [For BSC] *1997* Edition (NDS), which is hereby adopted as a part of this code, shall apply to the design and construction of wood structures using visually graded lumber, mechanically graded lumber, structural glued laminated timber, and timber piles. National Design Specification Appendix Section F, Design for Creep and Critical Deflection Applications, Appendix Section G, Effective Column Length, and Appendix Section J, Solution of Hankinson Formula are specifically adopted and made a part of this standard. The Supplement to the 1991 Edition National Design Specification, Tables 2A, 4A, 4B, 4C, 4D, 4E, 5A, 5B and 5C are specifically adopted and made a part of this standard.

Other codes, standards or specifications referred to in this standard are to be considered as only an indication of an acceptable method or material that can be used with the approval of the building official, except where such other codes, standards or specifications are specifically adopted by this code as primary standards.

2316.1.2 [For BSC] The National Design Specification for Wood Construction, 2001 Edition (NDS), as amended by Section 2316.3, which is hereby adopted as a part of this code, shall apply to the allowable stress design and construction of wood structures. The Supplement to the 2001 Edition National Design Specification, is specifically adopted and made a part of this standard.

Where a code, standard or specification referred to in this code conflict with a code, standard or specification referenced in the NDS-01 for allowable stress design of wood building, the NDS-01 shall prevail.

2316.2 Amendments.
Note: The provisions of this section shall not apply to applications regulated by the Building Standards Commission as referenced in section 101.17.3.

1. Sec. 1.1 Delete and substitute the following: …

2. Secs. 1.2 through 1.5. Delete.

3. Sec. 2.2 Delete first sentence and …

4. Sec. 2.3.2.1. In fourth sentence …

5. Sec. 2.3.2.3. Delete and substitute …

6. Table 2.3.2. Delete and substitute …

7. Sec. 2.3.4. Add paragraph …

8. Sec. 2.3.6. Add second …

9. Sec. 2.3.8. Add new second …

10. Sec. 2.3.10. Add a paragraph …

11. Sec. 3.2.1. Add a second …

12. Sec. 3.2.3.2 [For BSC] *3.2.3.3.* Add to the end …

~~13. Sec. 3.3.2. Add a last …~~

~~14. Sec. 3. 4. 4. Add a section as follows;~~ *Not adopted by the State of California*

3.4.4.5 When girders, beams or joists are notched at points of support on the compression side, they shall meet design requirements for the net section in bending and in shear. The actual shear stress as such point shall be calculated as follows:

f_v = 3V / 2b [d – ((d – d') / d') e]

where

d = total depth.
d' = actual depth of beam at notch.
e = distance notch extends inside the inner edge of support.
V = shear force.

Where e exceeds d', the actual shear stress for the notch on the compression side shall be calculated as follows:

F_v = 3V / 2bd'

~~15. Sec. 3.7.1. 4. Delete and substitute …~~

~~16. Sec. 3.8. 2. Delete and substitute …~~

~~17. Sec. 4.2. 5.5. Delete.~~

~~18. Sec. 4.4.1.1. Delete and substitute …~~

~~19. Sec. 4.4. 1.2. Delete first …~~

~~20. Sec. 5.4.1. Delete second …~~

~~21. Sec. 5.4.1. 2 Add a second …~~

~~22. Sec. 5.5.5. Add a section …~~

~~23. Sec. 5.4.5. Add a new section …~~

~~24. Sec. 8.3. Add a section …~~

~~25. Sec. 12.4.1 Delete and substitute …~~

2316.3 [For BSC] Amendments.

1. [For BSC] Sec. 2.2. Add a fourth sentence as follows:

Values for species and grades not tabulated shall be submitted to the enforcing agency for approval.

2. [For BSC] Sec. 2.3.2.1. In fourth sentence, delete "or Figure B1 (see Appendix B)."

3. [For BSC] Sec. 2.3.2.3. Delete and substitute the following:

2.3.2.3 *When using Section 1612.3.1 basic load combinations, the Load Duration Factor, C_D, noted in Table 2.3.2 shall be permitted to be used. When using Section 1612.3.2 alternate load combinations, the one-third increase shall not be used concurrently with the Load Duration Factor, C_D.*

4. [For BSC] Table 2.3.2. Delete and substitute as follows:

TABLE 2.3.2 LOAD DURATION FACTORS, C_D

DESIGN LOAD	LOAD DURATION	C_D
Dead Load	Permanent	0.9
Floor, Occupancy Live Load	Ten Years	1.0
Snow Load	Two Months	1.15
Roof Live Load	Seven Days	1.25
Earthquake Load[1]	—	1.33
Wind Load[2]	—	1.33
Impact	—	2.0

[1] 1.60 may be used for nailed and bolted connections exhibiting Mode III or IV behavior, except that the increases for earthquake are not combined with the increase allowed in Section 1612.3. The 60-percent increase for nailed and bolted connections exhibiting Mode III or IV behavior for earthquake shall not be applicable to joist hangers, framing anchors, and other mechanical fastenings, including straps and hold-down anchors. The 60-percent increase shall not apply to the allowable shear values in Tables 23-II-H, 23-II-I-1, 23-II-I-2, 23-II-J or in Section 2315.3.

[2] 1.60 may be used for members and nailed and bolted connections exhibiting Mode III or IV behavior, except that the increases for wind are not combined with the increase allowed in Section 1612.3. The 60-percent increase shall not apply to the allowable shear values in Tables 23-II-H, 23-II-I-1, 23-II-I-2, 23-II-J or in Section 2315.3.

5. [For BSC] Sec. 2.3.3. Add a second paragraph following Table 2.3.3:

The allowable unit stresses for fire-retardant-treated solid-sawn lumber and plywood, including fastener values, subject to prolonged elevated temperatures from manufacturing or equipment processes, but not exceeding 150_F (66_C), shall be developed from approved test methods that properly consider potential strength-reduction characteristics, including effects of heat and moisture.

6. [For BSC] Sec. 2.3.4. Add second, third and fourth paragraphs as follows:

The values for lumber and plywood impregnated with approved fire-retardant chemicals, including fastener values, shall be submitted to the building official for approval. Submittal to the building official shall include all substantiating data. Such values shall be developed from approved test methods and procedures that consider potential strength-reduction characteristics, including the effects of elevated temperatures and moisture. Other adjustments are applicable, except that the impact load-duration factor shall not apply.
Values for glued-laminated timber, including fastener design values, shall be recommended by the treater and submitted to the building official for approval. Submittal to the building official shall include all substantiating data.

In addition to the requirements specified in Section 207, fire retardant lumber having structural applications shall be tested and identified by an approved inspection agency in accordance with UBC Standard 23-5.

7. [For BSC} Sec. 5.4. Add a section as follows:

5.4.5 Ponding. Roof-framing members shall be designed for the deflection and drainage or ponding requirements specified in Section 1506 and Chapter 16. In glued-laminated timbers, the minimum slope for roof drainage required by Section 1506 shall be in addition to a camber of one and one-half times the calculated dead load deflection. The calculation of the required slope shall not include any vertical displacement created by short taper cuts. In no case shall the deflection of glued-laminated timber roof members exceed 1/2-inch (13 mm) for a 5 pound-per-square-foot (239 Pa) uniform load.

8. [For BSC] Sec. 5.4. Add a new section as follows:

5.4.6 Tapered Faces. Sawn tapered cuts shall not be permitted on the tension face of any beam. Pitched or curved beams shall be so fabricated that the laminations are parallel to the tension face. Straight, pitched or curved beams may have sawn tapered cuts on the compression face.

For other members subject to bending, the slope of tapered faces, measured from the tangent to the lamination of the section under consideration, shall not be steeper than 1 unit vertical in 24 units horizontal (4% slope) on the tension side.

EXCEPTION: 1.This requirement does not apply to arches.

2. Taper may be steeper at sections increased in size beyond design requirements for architectural projections.

9. [For BSC] Sec. 11.1.5.6. Delete and substitute as follows:

11.1.5.6 For wood-to-wood joints, the spacing center to center of nails in the direction of stress shall not be less than the required penetration. Edge or end distances in the direction of stress shall not be less than one-half of the required penetration. All spacing and edge and end distances shall be such as to avoid splitting of the wood.

Notation
Authority: Health & Safety Code Section 18934.5
Reference(s): Health & Safety Code, Division 13, Part 2.5, commencing with section 18901.

ITEM 5-5 – Committee Recommendations

<A>   AA   D   FS
APPROVED AS RESUBMITTED

* * *
(END OF ITEM)

INITIAL STATEMENT OF REASONS

STATEMENT OF SPECIFIC PURPOSE AND RATIONALE:

The California Building Standards Commission (CBSC) proposes the adoption of new amendments to current edition of the Uniform Building Code (UBC) of the International Conference of Building Officials (ICBO). The adoption of these amendments will make them applicable for use by individuals, businesses and state agencies as required by the Health & Safety Code, Section 18928.

2001 California Building Code, California Code of Regulations, Title 24, Part 2, Vol. 2:

The primary purpose for this proposed action is to amend the current edition of the UBC to reference a more current edition of the National Design Standards (NDS) and to clarify other amended sections. The necessity of this proposed action is to update the referenced structural standards for wood frame construction. The currently adopted model building code references the 1997 (NDS), as was amended by rule in an emergency proposal submitted last year by the Building Standards Commission. This action is proposed to further update the version of the NDS to the 2001 edition with amendments to be consistent with the structural requirements of the other adopting state agencies.

The secondary purpose for the amendments is to present them in an easily understood format which is to be consistent with other state agency amendments to these sections, including maintaining adoption of Table 16-N.1 and references thereto. §§ 1611.7, Table 16-O (Footnote 4), 1809.5.1, 1903.11, and 2108.2.6.2.6 (3) are amended to reflect January, 2001 errata to the 1997 UBC to be consistent with DSA SS and OSHPD. §§ 1665.2.3 (4) and 1665.4 (3 & 4) are amended to reflect March and October, 2001 errata to the 1997 UBC for the same reason.

TECHNICAL, THEORETICAL, AND EMPIRICAL STUDY, REPORT, OR SIMILAR DOCUMENTS:

This proposed action is mandated by the Health & Safety Code, Section 18928. A report of the January, March and October, 2001 errata to the 1997 UBC was used as the basis for the proposed adoption of the above-listed errata in amendments to the California Building Code.

CONSIDERATION OF REASONABLE ALTERNATIVES

There are no reasonable alternatives identified by the agency.

REASONABLE ALTERNATIVES THE AGENCY HAS IDENTIFIED THAT WOULD LESSEN ANY ADVERSE IMPACT ON SMALL BUSINESS.

No alternatives were identified by the agency to lessen the adverse impact on small businesses.

FACTS, EVIDENCE, DOCUMENTS, TESTIMONY, OR OTHER EVIDENCE OF NO SIGNIFICANT ADVERSE IMPACT ON BUSINESS.

No facts, evidence, documents, testimony, or other evidence of no significant adverse economic impact on business have been identified however, the adoption of amendments to the current edition of model code is mandated by the Health & Safety Code, Section 18928.

DUPLICATION OR CONFLICTS WITH FEDERAL REGULATIONS

There are no federal regulations related to the proposed amendments to the current edition of California building code.